

CLAIMS

1. A method of inspecting the topology of a surface of a structural member to determine the degree to which a known type of stress has been applied to the member, the method including the steps of:

providing a range of calibration samples of structurally equivalent members, the samples each having been subject to the known type of stress to a differing respective degree;

supporting a Moiré grid in a position spaced from and co-extending with the surface to be inspected and at a small included angle to the surface;

directing a source of light through the grid to strike the surface at an oblique angle thereto;

viewing the surface through the grid in a direction substantially normal to the surface to view interference fringes and regions of distortion to the fringes, and

measuring the extent of a said region of distortion and comparing the said measurement with equivalent measurements taken for respective calibration samples to determine the degree of stress applied to the member.

2. A method as in claim 1 in which the step of making the comparison between the said measurement and equivalent distances measured for calibration samples of a member of the same type, relevant dimensions and material, may include determining which sample exhibits substantially the same measured distance as the said member, and noting the degree of

stress applied to that sample, which degree of stress will substantially correspond to the stress applied to the said member.

3. A method as in claim 1 including the step of adjusting the small included angle to provide substantially the same fringe density as for the equivalent measurements taken on the calibration samples.

4. A method as in claim 1 including the step of providing a generally parallel said source of light.

5. A method as in claim 1 including the step of providing a substantially point source of said light.

6. A method as in claim 1 in which the step of measuring the extent of a said region of distortion comprises taking the greatest possible measurement across the said region substantially in line with the undistorted fringes, from commencement of distortion on one side of the region to ending of distortion on the other side thereof.

7. A method as in claim 1 in which, where the distortion to the surface comprises an annular region surrounding a hole in the surface, the step of measuring the extent of the region of distortion comprises taking the measurement substantially in line with the undistorted fringes from a periphery of a said hole to a point of fringe distortion farthest from the said periphery.

8. A method as in claim 1 including setting the said oblique angle substantially at one of 45 degrees and 63.2 degrees.

9. A method as in claim 1 including the step of taking a photographic image of the surface as viewed by the observer.

10 A method as in claim 9 including creating a digitized said photographic image, transferring the digitized image to a computer, image processing same and programming the computer to search for particular shapes of curve representing at least one of commencement and ending of regions of distortion of the fringes.

11. Apparatus for carrying out the method of claim 1 including a body supporting:

a Moiré grid for placement in a position spaced from and co-extending with the surface to be inspected and at a small included angle to the surface;

a source of light directed through the grid to strike the surface at an oblique angle thereto;

a viewing aperture for viewing the surface through the grid, and means for measuring the extent of a said region of distortion.

12 Apparatus as in claim 11 including a sighting device to enable the observer to determine whether the surface is being viewed substantially normal thereto.

13. Apparatus as in claim 12 in which the sighting device includes a mirror facing the observer, the mirror being fast with the body and having a line indicator spaced therefrom in the direction of the observer whereby when the observer views the surface substantially normal thereto no

reflection of the line indicator will be observable in the mirror.

14. Apparatus as in claim 11 in which the source of light comprises a light emitting diode.

15. Apparatus as in claim 11 including a high resolution, digital, still camera to photograph the surface.

16. Apparatus as in claim 15 including a computer programmed to process a digital image from the camera and search for particular shapes of curve representing at least one of commencement and ending of regions of distortion of the fringes.

17. Apparatus as in claim 11 in which the line spacings of the Moiré grid are substantially in the range 1 to 200 lines per mm.

18. Apparatus as in claim 17 in which the said range is substantially 5 to 20 lines per mm.

19. Apparatus as in claim 18 in which the said line spacing is substantially 10 lines per mm.